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ABSTRACT

This study identified instructional strategies that family and consumer science teacher candidates found useful, noting why the strategies aided their learning. A 2-hour lesson on classroom management using small group theory was selected based on its ties to constructivist pedagogy. Before teaching the lesson, the instructor described her instructional goals in an audiotaped interview. She taught the lesson 2 weeks into the semester. Data about the instructional environment were collected using a video camera and field notes. Analysis of these data identified major instructional patterns, which were used to construct a narrative description. The frequency of various strategies was estimated by tallying those present in the narrative description. Following the lesson, student teachers completed a questionnaire about the most important concepts they had learned, features of the instruction that helped them learn each concept, and why those aspects of instruction helped them learn the concepts. Two days later, four student teachers completed stimulated recall sessions, watching the videotaped lesson and stopping it in places where the instruction best aided their learning. Overall, participants learned best from cases about which they had prior knowledge. They found experiential learning very important and considered discussion moderately helpful. (Contains 38 references and 4 tables.) (SM)

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Application of Constructivism to Teacher Education

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Application of Constructivism to Teacher Education

Teacher candidates bring to teacher education some conceptions of teaching that are counter productive. For example, Mahlios, Marc and Maxson (1995) found that candidates planned to teach by telling rather than by encouraging students' active construction of knowledge. Likewise, several studies of candidates' conceptions of diversity and multicultural education report that candidates have limited awareness of inequity (Avery & Walker, 1993; McCall, 1995), and doubt their abilities to teach children from diverse backgrounds (Harrington & Hathaway, 1995; Ross & Smith, 1992). Further, Weinstein (1989) found that candidates were focused on interpersonal relationships and not on learning strategies that would facilitate understanding.

As a teacher educator in family and consumer sciences (FCS), I work to change candidates' counter productive conceptions as they take my teaching methods course and then complete their student teaching. Such efforts stem from a deep commitment to the profession's mission of empowering individuals and families. If candidates learn to use student-centered, democratic practices that enable secondary students to construct deep, conceptual understandings of FCS subject matter, they will have the knowledge and skills to solve problems and make decisions in everyday life based on their present circumstances. This study was, therefore, prompted by a desire to know which instructional approaches prompt the most change in candidates' conceptions.

In a review of studies that examine change in candidates' conceptions and practices (Jensen & Winitzky, 1999), the 32 studies reporting change (e.g., Copeland & Decker, 1996; Morine-Dershimer, 1989; Stroiber, 1991) attributed it to a large number of instructional approaches, from case analysis to reflective peer teaching sessions. A careful scrutiny of studies that reported change revealed that sufficient empirical evidence does not support widespread use of the instructional approaches that researchers

advocate. Less than one-third of researchers' claims concerning the strategies that prompted change were supported with evidence. In some studies, researchers neglected to mention how they had arrived at their conclusions by connecting claims with specific sources of data, and in other studies researchers conjectured beyond their data in alleging that a particular strategy or strategies had prompted change. Consequently, our knowledge about candidates' learning given differing instructional environments is extremely fragmented.

We do know from constructivist theories that teacher candidates "actively mediate between teachers' actions and their own learning during classroom instruction." We also know that "learning occurs as they make sense of instructional events by using their existing cognitive structures to interpret environmental stimuli" (Eisenhart and Borko, 1991, p. 142). These understandings help to partially explain why information is or is not meaningful to preservice teachers. Knowledge construction, therefore, is viewed as a personal, idiosyncratic process. Nevertheless, constructivist theorists indicate that learning is more likely when instruction involves "more student-centered, active learning experiences, more student-student and student-teacher interaction, and more work with concrete materials and in solving realistic problems" (Winitzky & Kauchak, 1997, p. 62). Although useful, these notions of constructivist teaching are still too broad for immediate application in teacher education.

Constructivism as a learning theory lacks corresponding theories of instruction that describe optimal learning environments for teacher candidates (Gelman, 1996; Winitzky et al., 1997). Such glaring omissions in our knowledge of candidates' learning limits the effectiveness of teacher education because too much of what they learn is left to chance. Until teacher educators know more about why candidates find salient some but not other features of various instructional environments, constructivism will

remain at best a learning theory with limited ability to inform teaching.

The purpose of this exploratory, mixed-design study was to inform constructivism by investigating its application to instruction within the domain of teacher education. Previous studies have focused more generally on global investigations of what candidates learn over an entire course or program. This study, in contrast, focused on the micro level (i.e., a lesson). Specifically, the purpose of this detailed, fine-grained study was to identify the instructional strategies that 16 FCS teacher candidates attended to, and why these strategies aided their learning. Research questions included: (1)What were the instructor's goals?, (2) What instructional strategies were present in the lesson?, (3) What instructional strategies did teacher candidates find salient?, (4) Why were various instructional strategies salient for candidates?, and (5) What relationships, if any, existed among the first four questions? These questions were part of a larger study.

Method

Sixteen female teacher candidates participated in the study. Candidates were enrolled in an integrated sequence of three education and FCS teaching methods and curriculum courses. They took these courses the semester before completing their student teaching in secondary schools. Participants attended a large, private university operated by a religious organization in the Rocky Mountains. A demographic questionnaire revealed that one-fourth of the sample were married; fifteen candidates were Anglo American and one was Hispanic; ten candidates were fluent in a language other than English. Their mean age was 24.

Dr. Adams, the instructor who participated in the study, was an Anglo American female in her late-50's. She was an associate professor and teacher educator in the School of Family Life, and had worked in her present position since 1980. She team-taught the three courses with two faculty members from

secondary education, and has taught these courses with one of them for the last decade.

From descriptions of six lessons supplied by the instructor, a 2-hour lesson on classroom management using small group theory was selected based on its ties to constructivist pedagogy, and claims about the instructional strategies that had prompted change within the 32 studies mentioned previously. Before teaching the lesson or instructional episode, the instructor described her instructional goals in an audiotaped interview. To condense the interview data, a summary containing the major ideas was written, and Dr. Adams read the summary to ensure that it accurately depicted her thinking.

The instructor taught the lesson on classroom management 2 weeks into the semester. A video camera and field notes were the means used to gather naturalistic data about the instructional environment. Analysis of the video transcript and field notes focused on identifying major instructional patterns, which were then used to construct a narrative description. Dr. Adams read the description to insure its accuracy and increase validity. To provide a more quantitative means of analysis, I also estimated the frequency of various strategies by tallying those present in the narrative description. I coded and recoded the description of the lesson until reliability reached 97.7%. That is, on separate occasions I coded and then recoded the description the same in 84 of 86 instances. In all instances where I could not determine the number of times an instructional strategy was used, I referred to the video transcript. Further, I tallied the frequencies for all codes on three occasions to ensure that the frequency count for each code was accurate.

At the end of the lesson, candidates completed a questionnaire where they identified in writing (a) the most important concept(s) they had learned, (b) the features of instruction that helped them to learn each concept, and

(c) why these aspects of instruction helped them to learn the concept(s). Findings reported here are related to candidates' responses to the latter two queries. Codes for analyzing candidates' responses concerning the instructional strategies that helped them to learn were generated inductively. I coded candidates' responses twice to ensure reliability and then shared the codes with an eminent teacher thinking scholar. She suggested that I divide one of the codes into two codes because candidates' responses suggested they had learned from at least one of two strategies that have varying assumptions. I then recoded candidates' responses on two more occasions and conducted a reliability check with her. Interrater agreement was 100%.

Candidates' responses concerning why various instructional strategies helped them to learn were categorized deductively using theory-driven codes. I also remained open to the possibility that other codes could be derived if I determined that a category of data was not being represented by those that I had previously identified. Codes were based primarily on information processing and schema theory (Derry, 1996; Eggen & Kauchak, 1999; Gelman, 1996; Reynolds, Sinatra, & Jetton, 1996; Winitzky et al., 1997). In addition, one code was based on the motivation literature, and another was based on conceptual change learning.

On two days following the instructional episode, four randomly selected candidates participated in two stimulated recall sessions, one on each day. Each stimulated recall session was audiotaped. Either myself or a trained research assistant viewed a videotape of the instruction with each participant using a videocassette recorder (VCR) and a television monitor. Rather than show candidates video episodes that researchers or the instructor recognized as critical incidents, each student was instructed to stop the videotape in places where the instruction best aided her learning. The reason for this procedure was that teacher educators use instructional approaches based primarily on what they believe will make the content relevant. Teacher

candidates, however, may not find these approaches salient, persuasive, or convincing. At the points where the video was stopped, each candidate identified the instructional strategy that helped her to learn, why it was helpful, and what she learned. Reported here are findings related to the first two queries.

To analyze candidates' stimulated recall responses concerning the instructional strategies that helped them to learn, I condensed onto matrices each of the 4 candidates' interview responses. A three-part procedure enabled me to do so for each candidate. First, I began reading the lesson transcript several minutes before the time where the candidate had stopped the videotape, and I continued reading just past the stop. Then I read the candidate's interview response, and decided what portion of the response to condense to adequately answer the research question. I generated two decision rules to ensure consistency in condensing responses. Before repeating this procedure a second time, I spent several months analyzing data to answer other research questions. The only difference in the procedure the second time through was that I also referred to how I had portrayed the instruction in the narrative description. My repeating this procedure ensured that I had condensed the portion of candidates' responses focused on the instructional strategies.

I then generated codes or categories of the instruction inductively by grouping candidates' responses and writing code definitions. To condense codes and increase reliability, I coded each candidate's responses on three separate occasions before having the teacher thinking scholar mentioned previously conduct a reliability check. To help me think about candidates' condensed responses in context, I re-read the lesson transcript and their entire responses during each reliability check. The scholar independently coded a random sample of candidates' responses using a similar procedure. We discussed the few instances where we had not applied the same codes until reaching full agreement.

Candidates' responses during stimulated recall interviews concerning why the instruction helped them to learn were condensed onto matrices in the same manner as their responses concerning the instructional strategies that helped them to learn. Responses were then categorized deductively using theory-driven codes. Like the analysis of questionnaire data, these codes were based primarily on information processing and schema theory. Once again, I remained open to the possibility that other codes could be derived if I determined that a category of data was not being represented by those that I had previously identified. A few additional codes, therefore, were generated that correspond with the literature on metacognition, conceptual change learning, and motivation.

I compared those instructional features present during the lesson with those that candidates reported as salient during the stimulated recall interviews. I first rank-ordered the six major code categories from each table by frequency and placed them along side one another. To compare these variables in a more fine-grained manner, I then placed all of the strategies on a matrix containing two axes, i.e., instructional salience reported during stimulated recall interviews, the use of instructional features during the lesson. Both axes contain continuums that include high, moderate and low quadrants.

Findings

What were the instructor's goals?

Interview data suggested that Dr. Adams intended that the lesson integrate concepts from small group theory and classroom management. She wanted candidates to understand the personal and required systems, synonyms for concepts from social psychology. These concepts were initially described in Getzels and Thelen's (1960) classic work on basic social structures within the classroom. The required system refers to structures that are formal and institutionalized, and the personal system refers to personal characteristics

of individual students.

Dr. Adams wanted candidates to learn to delegate responsibility for managing the required system to small groups of students. She also wanted candidates to learn to use the personal system to emphasize individuality, variation and the social aspects of the learning environment. Inherent in her thinking was that candidates can use small groups as a means of organizing students to manage various aspects of classroom life. These include: (a) the things in the near environment, (b) group processes among students, and (c) the assessment of practices within the classroom. Dr. Adams also saw using small groups as a means to: (a) increase the focus on teaching and learning by reducing the amount of teacher time spent on management, (b) shift more control from the teacher to students, and (c) heighten student motivation. Ultimately, she wanted to teach them to create a learning environment where democratic leadership prevails.

In addition to talking about the content, Dr. Adams also described the instruction. She portrayed it as being activity-oriented. That is, she planned to establish set using candidates' prior knowledge of the previous day's lesson. She also intended to employ a case so that students could see the effects of delegating responsibilities to small groups of students. A pattern throughout the lesson would be to have candidates experience an activity and then debrief it. Dr. Adams selected topics to assign to students as they work in small groups that create an emotional bonding among them. Finally, Dr. Adams planned to assess candidates' learning as they used small groups during field experiences.

What instructional strategies were present in the lesson?

During the 2-hour episode, the instructor used a variety of instructional strategies. Provided here is a detailed, narrative description of the lesson.

Dr. Adams established set by connecting specific student comments from

the previous day's lesson with the concepts "personal system" and "required system." She then provided a rationale concerning why candidates should learn the two. The instructor wrote on the chalk board and briefly defined "required system." She had students think about a familiar example (i.e., the required system at the university) and asked them for examples of the concept. Five students responded with examples. The instructor paraphrased each response, wrote them on the board, and in some instances expanded on responses. She summarized the discussion by incorporating related concepts and by defining the concept.

She then used a similar instructional pattern to teach students the concept "personal system." She focused on what they had learned the previous day to connect the new concept with their prior knowledge, and she made connections between the required and personal systems. Again, she briefly defined "personal system" and asked, "What are the different things that come with you personally to this group?" Six students responded to her question with examples whereupon she paraphrased each, wrote responses on the board, and in some instances expanded on students' examples. The discourse was not in a hurry. It was a relaxed pace. Humor and a positive feeling were present. The instructor mentioned the two systems and again provided a rationale for understanding them.

Dr. Adams used a transition and then asked a student who her favorite character was and why from a book all students were familiar with. Dr. Adams talked about her favorite characters in the book and why they had meaning for her. She then asked students what they knew about a specific story. Twenty-two responses were given by students. The instructor paraphrased many of their responses and sometimes elaborated on them. Based on student responses, she asked questions to focus candidates' attention on certain ideas. After a few minutes, students mentioned characters and events central to the lesson concepts. Dr. Adams focused the classes' attention on certain people and

events in the story, and had a student read a portion of it to the class. The story served as a case.

At this point, the classroom climate was such that students were serious and very focused on learning. At the same time, the communication was open and students had high amounts of influence. Before the student began to read aloud, Dr. Adams emphasized the fact that the leader in the story was making many decisions. She also noted the role of an advisor. As the student read, Dr. Adams stopped her in three different places to focus candidates' attention on various parts of the story. At the first stop, the instructor had the student read one sentence again to focus candidates' attention on the fact that the leader was making all the decisions himself. At the second stop, the instructor asked students what was happening to emphasize that the advisor had the leader divide people into smaller groups. Finally, Dr. Adams had the student read again two sentences that emphasized the roles of the leader and smaller groups of people.

When the student finished reading, the instructor used a transparency to show all of the kinds of decisions the leader was making before the advisor counseled him to divide people into smaller groups. While students viewed the transparency, Dr. Adams asked them who was in charge of making various decisions. Students responded each time that it was the leader. The instructor then asked students what the advisor told the leader. They responded, "You cannot do it all alone." Dr. Adams put up another transparency with a diagram showing that the entire group was not making much progress until the leader divided them into groups. She asked a student how people were organized into small groups and then used a transparency to illustrate the organization. As students viewed the transparencies, Dr. Adams compared what it was like before and after the leader divided people into smaller groups. She asked questions to enable candidates to focus on the concepts embedded in the story. She then tied in concepts taught earlier in

the lesson (i.e., the two systems) and talked about why candidates should use small groups in the classroom.

The instructor next discussed the syntax for the small group method "Huddle" and some accompanying practices for having students work in small groups. She explained the assignment that candidates would be working on and divided them into small groups. The assignment required each student to take three opportunities to tell something about herself that was really extraordinary.

The kinds of things candidates mentioned within the group that I was near were not particularly extraordinary, but instead unique and/or humorous. As each candidate took a turn, her peers would most often make brief comments about the information. A few students, upon hearing a peer's unique information, told similar information.

To debrief the method, the instructor asked questions that enabled candidates to discuss their experience with the method. As students responded, the instructor synthesized their responses to focus them on specific uses of the method. She also described her observations as candidates experienced the method. Finally, she asked students about the kinds of topics for which they could use the method. Dr. Adams paraphrased student responses, made connections between them, and elaborated on them.

To introduce another small group method, Phillips 66, the instructor gave an example of when she had used the method. She explained the name, a mnemonic device, to help candidates remember a major element in the syntax, i.e., when using Phillips 66, six people stand in a circle and work together for 6 minutes. Dr. Adams also wrote the name of the method on the chalk board. She then explained a way of designating a group leader who would be responsible for keeping notes, reporting back, and starting the discussion. She began to divide students into groups. Before she finished giving directions, candidates started to move into groups. Dr. Adams emphasized the

problem of not giving directions first and having students move before they understood directions. She told them to try to give all directions and then let students move. Their assignment was to discuss the things about the class that worried them the most.

Students' interactions in the small group nearest me exhibited a recurring pattern. A student would express a concern. Other students would express like concerns and/or build on each others' comments. In some instances, candidates would offer solutions. Then a new concern would be expressed, and a like pattern would occur again.

Dr. Adams had the class reassemble and she explained a procedure for having the group leaders report back to the entire class. That is, each reporter would tell the class one thing on her list. The instructor explained that this continued until a reporter said, "All of mine have been mentioned." For approximately 10 minutes, Dr. Adams addressed students' concerns as they were mentioned. She then stopped the reporters to briefly focus students on the process and pass out two handouts that contained the syntax for the two methods. Further, she mentioned examples of other small group methods that candidates would learn about on other days.

Dr. Adams used a transition and focused students' attention on how the personal and required systems and small groups were linked to other concepts, i.e., diversity, structure, flexibility, near environment, managing things. To aid their understanding of the relationships between these concepts, she mentioned managing resources in the home, something candidates had a great deal of background knowledge about. The instructor then made connections to managing the classroom.

Dr. Adams asked a question about what small groups of students can do to help teachers manage the classroom. A candidate responded with an example where students are active learners as they complete assignments in small groups. Dr. Adams focused students' attention on her comment, had them circle

it in their notes, and then refocused candidates on using small groups for classroom management. Two candidates named examples that the instructor asked questions about and elaborated on.

Lecture was the predominant form of instruction used during the last 25 minutes of the 2-hour lesson. During this time, the instructor related another case to illustrate the kinds of things groups of students can manage, and the role of the teacher and students. She integrated several references to the first case. Further, she gave many examples of things in the classroom that small groups can manage in addition to examples of ways that small groups can manage the social aspects of the learning environment. She noted that candidates would be divided into small groups during the course to manage the classroom and she gave a rationale for doing so.

The instructor further talked about lesson concepts, used them with many examples to illustrate how they could applied in the classroom, and made references to the first case. When Dr. Adams focused on evaluating students' participation in small groups she asked, "How would you evaluate your participation in Huddle?" A student responded and Dr. Adams elaborated on the student's response and made connections with candidates' prior knowledge from previous lessons as she talked about the process. The instructor also wrote concepts related to the process on the chalk board.

She then expanded on her second case to illustrate the evaluation processes that both the students and teacher use, and made reference to the leader in the first case. She connected evaluation to other lesson concepts and talked about when candidates would get to practice the process and other small group methods. At the end of the lesson, Dr. Adams reviewed how the lesson concepts were connected and provided a rationale for using small group theory to manage the classroom.

What instructional strategies did teacher candidates find salient?

Both questionnaire and stimulated recall data were used to determine the

strategies that candidates found salient. An examination of frequency counts highlights eight strategies as being highly salient for candidates. These eight strategies included: students experienced a way to report back following their experience in small groups, candidates experienced a small group teaching method, the instructor used a case, the instructor gave an example, the instructor explained concepts and relationships among them, the instructor elaborated on students' comments and/or examples, the instructor asked a question and student(s) provided a response, and student(s) responded with example(s) of a concept in response to a question posed by the instructor. These highly salient strategies can be grouped into four strategy clusters or instructional features including: experiential learning, teaching concepts, instructor explanations, and teacher questioning/student responses. Those two strategies of highest salience were associated with experiential learning, and were followed in salience by the instructor's use of a case.

Nearly half of all strategies used had low salience for candidates. Specific strategies included instructor paraphrases student responses, instructor used a transition, instructor refocused candidates' attention based on a student's example, instructor focused candidates' attention by telling them an idea was important, instructor used an emotion-laden word, instructor had a candidate read two sentences twice in the case, instructor focused attention on the major character in the case by telling a humorous personal story, instructor had candidates circle an idea in their notes, instructor made reference to a case described earlier in the lesson, students experienced a negative exemplar, instructor named the concept after students had experienced it, instructor established set, instructor used a mnemonic device, a handout distributed by the instructor, and students took notes. Most of these strategies low in salience were associated with focusing attention. A few of them were also related to teaching concepts and instructor explanations.

Tables 1 and 2 display frequency counts for specific strategies. The most striking difference when examining these tables was that "instructor explanations" has the lowest frequency count given data from the questionnaire and the highest frequency count given stimulated recall data. Note that data from the latter instrument provided for a more fine-grained investigation of candidates' thinking than did data from the former instrument. That is, the short questionnaire allowed for brief, general reflections of learning whereas the stimulated recall interviews allowed minute to minute, detailed reflections of learning. In re-examining candidates' responses to the questionnaire coded as "discussion," it is unclear whether the responses refer to dialog between the instructor and students or to instructor explanations. If the responses were referring to instructor explanations, then the difference between the two data sources would not have appeared to be so striking. That is, the same three features would have the highest frequency counts given both data sources.

Despite differences in the results from the two instruments, the three most salient instructional features for candidates appear to have been: use of various means to teach concepts, experiential learning, and instructor explanations. I included instructor explanations as such because this code's frequency count (26) is so much higher than the two features having the next highest frequencies given stimulated recall data.

Why were various strategies salient for candidates?

I report findings here from the questionnaire completed by all 16 participants and stimulated recall interviews with four participants. Within both instruments, candidates were asked why the instruction helped them to learn. The findings from both measures generally support one another. In fact, the similarities are marked. Again, any differences are likely due to the type of responses elicited by each instrument.

I grouped candidates' reasons into 11 categories (see Tables 3 and 4).

Of these categories, candidates most often cited elaboration, intelligibility (Posner, Strike, Hewson, & Gertzog, 1982), rehearsal/repetition, and personal relevance (Chaiken & Stangor, 1987; Dole & Sinatra, 1998; Johnson & Eagly, 1989; Petty, Ostrom, & Brock, 1981; Sherif & Hovland, 1961) as the reasons for their having learning from various strategies. In comparing the findings from the two sources of data, the similarity of those elaboration sub-codes with the highest frequencies is striking. Four of the five reasons candidates gave for having learned when responding to the questionnaire were also the most frequent reasons mentioned during the stimulated recall interviews. A difference is that the instructor's use of a case as a good example of concepts was the most frequently cited reason candidates gave in their response to the questionnaire. Table 4 lists the reasons given during stimulated recall interviews in order of frequency. Notice that the instructor's use of a case is further down the list. In addition, in scanning the elaboration sub-codes from the stimulated recall interviews, five of six sub-codes or reasons lowest in frequency were not mentioned in response to the short questionnaire. The level of magnification provided by each instrument is a likely explanation why candidates mentioned twice as many forms of elaboration during the stimulated recall interviews than in response to the questionnaire.

Additional support for this conclusion is evident in those responses to the questionnaire coded as "active participation/experience." These responses provided general information about candidates' learning while in small groups, possibly because of the limitations of memory given the task and/or the small space provided for each candidate's written response. That is, the instrument may not have enabled candidates to recall more specific information concerning their learning. The stimulated recall interview, in contrast, enabled candidates to recall reasons that were inherent characteristics of having participated in small groups, i.e., forms of elaboration. The stimulated

recall interviews, for example, enabled candidates to give specific reasons such as students responding to and/or building on their peer's comments, and a student generating an explanation in response to the instructor's question as the class debriefed candidates' use of a small group strategy.

Intelligibility, rehearsal/repetition and personal relevance were the next most frequently cited reasons for candidates' learning. The codes "intelligibility" and "rehearsal/repetition" were both used slightly more often than was the code "personal relevance" to categorize candidates' responses to the questionnaire. The findings from the stimulated recall data differed from those from the questionnaire in that intelligibility had a much higher frequency count than did rehearsal/repetition and personal relevance. The reason for this discrepancy is unclear. Personal relevance and rehearsal/repetition have comparable frequency counts given both sources of data.

The next two most frequently mentioned reasons candidates gave in response to both instruments were the "information is meaningful to begin with" and "orienting stimuli." Notice that these two codes have the same frequency count within each source of data.

Finally, in surveying the remaining codes used to categorize stimulated recall responses (i.e., those having the lowest frequency counts), only one of the four codes was also a code used to categorize responses to the questionnaire. That is, one candidate cited the instructor's use of hierarchies as a reason for her learning. The codes "metacognition" (Baker & Brown, 1984), "peripheral route to persuasion" (Dole et al., 1998; Petty & Cacioppo, 1980), and "plausible" (Posner et al., 1982) were only used to categorize the stimulated recall data. Once again, the lower level of magnification provided by the questionnaire is the most feasible reason for the discrepancy between the two data sources. In the next section, I report the one major finding concerning a relationship between research questions.

What relationships, if any, existed among the first four questions?

Instructional time was related to those strategies that were of greatest salience for candidates. Although strategies of greatest salience, moderate salience and low salience ranged along a continuum in terms of their use during the lesson, the three strategies used for the longest duration were the most salient ones for candidates. An implication for practice is apparent. Teacher educators should carefully select the strategies they spend the most time using to ensure that these strategies are well suited to teach the kind of knowledge they want candidates to construct.

Discussion and Implications of Findings

The most central notions underlying constructivist learning theories can be consolidated into three overlapping basic tenets. The tenets include:

1. Prior knowledge serves as the basis of knowledge construction (Ausubel, 1968; Calderhead & Robson, 1991; Resnick, 1989). In order to make sense of or interpret information, students must transform and organize it in accordance with their existing cognitive structures (Eisenhart & Borko, 1991). What this implies for teaching is that instruction should enable students to make connections between what they already know and course content.

2. Meaning is negotiated through social interaction (Tobin, 1994). What this implies for teaching is that students have many opportunities for social interaction with their peers and the teacher throughout instruction because prior knowledge and learning are driven by meaning, not the environment (Driscoll, 1994).

3. In terms of individual cognitions, and social and political processes (Phillips, 1995), knowledge construction is an active process (Derry, 1996). The process is dependent on what an individual does (Fosnot, 1989; Gredler, 1992). It is related to activity that can be mental, physical or both (Phillips, 1995). What this implies for teaching is that learning is more likely when the instruction involves "more student-centered, active learning

experiences, more student-student and student-teacher interaction, and more work with concrete materials and in solving realistic problems" (Winitzky et al., 1997, p. 62).

An important question is whether the findings from this study support these tenets. The instructor's use of a case does support the first tenet concerning candidates' prior knowledge. Findings from stimulated recall interviews and the questionnaire provided evidence that the case was one of the three strategies of greatest salience for candidates. Recall that all candidates in the sample had the same religion in common. That they shared a great deal of background knowledge about the case, a religious story, was striking. Candidates volunteered 22 responses when the instructor asked them what they knew about the case. It is not surprising then, that candidates most frequently said that the reason they learned from the case was because they could understand it.

Due to candidates' prior knowledge about the case, it provided a powerful means of focusing their attention on the difference it made when a leader did everything himself, and when he delegated the management of various aspects of group life to smaller groups of people. The case served as a reference point in teaching candidates about delegating various aspects of classroom life to smaller groups of students. In addition to the case, candidates also cited instructor explanations of concepts and the relationships among them as a strategy of moderately high salience because, among other reasons, the instructor connected what they already knew with new information.

The next two tenets concerning the negotiation of meaning and the construction of knowledge as an active process were supported in that, of approximately 25 strategies, candidates found the two strategies associated with experiential learning to be most salient. Recall that the most prominent reason these two strategies were salient for candidates was because they were

active participants in constructing shared meaning. Experiencing a small group teaching method enabled students to generate examples of concepts and respond to and/or build on their peers' comments. Further, the instructor addressed candidates' concerns as they reported back.

That candidates also found discussion to have moderately high salience further supports these two tenets. Candidates cited active participation as a primary reason for their learning, given discussion. Specifically, candidates mentioned having generated examples of concepts and having given explanations in response to the instructor's questions. They also noted that the instructor responded to and/or built on their comments. Candidates further indicated that they learned because discussion enabled them to comprehend the information, i.e., it was intelligible.

This analysis suggests that one of the first things teachers, including teacher educators, need to do in creating an effective learning environment is ask themselves, "What background knowledge do my students share that can serve as a reference point?" Teacher educators also need to ponder the equally challenging and important question, "What experiential activities can I provide my students so that they socially construct common knowledge upon which to build?" Interestingly, two related forms of experience or experiential learning were the most salient strategies for candidates in this study.

It is important to note that experiential learning enabled candidates to experience the process that the instructor wanted them to learn, and the experience greatly aided student learning. The instructor used small groups to manage the social aspects of the learning environment within her teaching methods course. Whether teacher educators rely more on cognitive or social constructivism to guide their planning, one implication for practice seems clear. Teacher educators should themselves employ the concepts they want candidates to learn. It is especially noteworthy that forms of experiential

learning were more salient for candidates than any other strategy used by the instructor. The candidates in this study were high-achieving students probably accustomed to learning passively and solo. Students admitted to the university during candidates' senior year had an average high school GPA of 3.7 with an ACT score of 28 (Admissions Office, personal communication, June 12, 2000).

Findings from the present study confirm the basic tenets of constructivist learning theory. In addition findings have extended and validated these tenets for an emergent theory of constructivist learning environments. It is vital to note, however, that certain additional findings do not correspond well within a constructivist framework. Personal relevance, a concept from the motivation literature, was a major reason candidates learned from various strategies that proved to have high and moderately high salience. Specifically, these were: experiencing a way to report back, the case, instructor examples, and instructor explanations of concepts and the relationships among them. These strategies enabled the instructor to tap into and connect the lesson content with something of great concern or immediacy for candidates. This motivational construct is not included in research on constructivism.

As candidates discussed with their peers in small groups what worried them the most about the course, student teaching, and teaching, one of their central concerns or goals focused on how to manage the social aspects of the learning environment. These kinds of motivational factors are not well accounted for by constructivist learning theories. The findings suggest that teacher educators should pay more attention to the personal goals and concerns that candidates bring to teacher education.

Although candidates' prior knowledge is a notion of central importance within constructivism, its meaning is generally associated with conceptual knowledge rather than motivational factors associated with the realm of social

psychology. Dole et al. (1998) note,

> Social psychologists include a full range of affective factors in their discussions about schemata. Although Bartlett (1932) and some later theorists may have originally conceptualized schemata in the same way (e.g., Spiro, 1980), the focus of cognitive psychologists on the information-processing metaphor likely resulted in the elimination of such affective components in later discussions about schemata. (Fiske & Taylor, 1991, p. 114)

Personal relevance, as an important reason for candidates' learning, is of monumental consequence because of its implications for both practice and future inquiry. For example, one implication for practice is that teacher educators ask candidates what is of concern to them, and then address these concerns using course content. On the whole, examination of the motivational constructs that may influence candidates' learning, such as personal relevance, is piecemeal.

The reason that the notion of personal relevance from the current study is important is because, like my initial review of the literature, this finding also points to the need for researchers to cast a larger net to account for more of the understandings that candidates bring, and how various instructional approaches influence these understandings.

Our current understandings of the influences on candidates' learning leave us to throw up our hands in dismay and conclude that candidates simply cannot learn what they need to know. An abundant body of empirical and theoretical scholarship exists with learners in other contexts that could be brought to bear on future investigations of preservice teacher learning. Reviews related to conceptual change such as Pintrich, Marx and Boyle (1993)concerning the role of motivational factors, classroom contextual factors, and cognitive factors, and by Dole et al. (1998) concerning the research literature from cognitive psychology, social psychology, and science

education are enlightening. They provide a basis on which to wonder if we have not oversimplified or restricted our thinking about preservice teacher learning. Examinations of candidates' learning using some of the factors mentioned in these reviews have been conducted, but they are few in number, leaving our knowledge of preservice teacher learning incomplete. We are not at a place where we can pose a model of preservice teacher learning that provides direction for both research and practice.

Until we can construct useful models of preservice teacher learning "that promote deeper and more detailed analyses" (Derry, 1996, p. 173), we are at great risk within the academy because our work as teacher educators is not grounded in theory. An important implication of this study for becoming more grounded in theory includes focusing more attention on what candidates bring to teacher education, and focusing on how various instructional environments influence what they learn. The inclusion of motivational factors mentioned by Pintrich et al. (1993) and Dole et al. (1998) provide possible avenues for future inquiry into candidates' learning.

Future Research Implications

Teacher educators most often use a combination of strategies with teacher candidates. In order to confirm and extend the findings from the current study, more descriptive studies are needed that examine instructional salience. Also needed are experimental studies that test those strategies that appear the most and least salient for candidates.

Due to the limitations of the present study, we do not know if the strategies used by the instructor have the same salience for other candidates in FCS, for teacher candidates generally, or for all students. We also do not know whether instructional features vary in their salience for candidates, given differing kinds of concepts within the knowledge base or within varying subject areas. More research in diverse subject areas, with diverse learners, and over extended periods of time is needed to address these questions.

Another important question for future research is whether significant instructional events happened that were not salient due to candidates being unaware of them. In this regard we need to distinguish salience from importance. Candidates did not find salient several strategies that would seem important for learning. For example, the instructor's paraphrasing candidates' responses, a form of repetition and a way of personalizing instruction, was not salient for candidates. It would be interesting to explore the differences in candidates' learning when the instructor did and did not paraphrase their responses. An important methodological issue, then, is the measurement of tacit knowledge and learning.

In conclusion, this study is a beginning point for expanding constructivist learning theory to its application for teaching. To construct a theory of learning environments for teacher candidates, many more studies are needed that examine the salience of various approaches, and the influence that they have on candidates' learning. Future studies also need to include a broader array of motivational factors that affect candidates' learning. The documented connections between teacher knowledge and student learning underscore the need for validated instructional approaches within teacher education that are grounded in theory.

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Table 1

The Features of Instruction that Candidates Reported as Salient during Stimulated Recall Interviews

Codes	Frequency	Total Frequency
Instructor Explanations		26
1. Instructor explained concepts and relationships among them	9	
2. Instructor elaborated on students' comments and/or examples	6	
3. Instructor explained a strategy or syntax for a method in whole or in part	5	
4. Instructor gave a rationale for learning lesson concepts	3	
5. Instructor connected candidates' prior knowledge with new information at the beginning of the lesson (established set)	2	
6. Instructor used a mnemonic device	1	
Teaching Concepts		19
1. Instructor gave an example	8	
2. Instructor used a prototype	6	
3. Students experienced a negative exemplar and the instructor focused their attention on it	2	
4. Instructor elaborated on a student's comments with an example	1	
5. Instructor made reference to a prototype described earlier in the lesson	1	

Table 1 Continued

Codes	Frequency	Total Frequency
6. Instructor named the concept after students had experienced it	1	
Experiential Learning		17
1. Students experienced a way to report back	9	
2. Candidates experienced a small group teaching method	8	
Teacher Questioning/Student Responses		14
1. Instructor asked a question and a student(s) provided a response	7	
2. Student(s) responded with an example(s) of a concept in response to a question posed by the instructor	6	
3. Instructor refocused candidates' attention based on a student's example in response to the instructor's question	1	
Visual Stimuli		14
1. Instructor wrote concepts on the chalk board	5	
2. One or more transparencies containing a matrix that succinctly organized information	4	
3. Instructor modeled a behavior	3	
4. Instructor modeled a strategy	1	

Table 1 Continued

Codes	Frequency	Total Frequency
5. A handout was distributed by the instructor	1	
Focusing Attention		14
1. Instructor mentioned an idea/concept more than once	4	
2. Instructor focused candidates' attention by telling them an idea was important	2	
3. Instructor focused candidates' attention on a concept in the prototype by asking a question	2	
4. Instructor focused candidates' attention on the major character in the prototype by telling a humorous personal story about how she came to like him	2	
5. Instructor used a transition	1	
6. Instructor used an emotion-laden word	1	
7. Instructor had candidates circle an idea in their notes	1	
8. The instructor had a candidate read two sentences twice in the prototype	1	
Miscellaneous		3
1. Student took notes	3	

Table 2

The Features of Instruction that Candidates Reported as Salient on the Questionnaire

Codes	Frequency	Total Frequency
Teaching Concepts		10
1. Instructor used a case(s)	7	
2. Instructor used an example(s)	3	
Experiential Learning		9
Visual Stimuli		7
1. Modeling	4	
2. Instructor writes concepts on the	2	
3. Instructor uses transparencies	1	
Discussion		4
Focusing Attention		4
1. Instructor repeats something more than once	3	
2. Instructor emphasizes a concept	1	
Instructor Explanations		3

Table 3

Reasons Given in Stimulated Recall Interviews Concerning Why Candidates Learned

Codes	Frequency	Total Frequency	[a]Responses Per Student
Elaboration		56	13, 24, 4, 15
1. Instructor gives examples	11		
2. Student(s) generates example(s)	10		
3. Instructor reviews old information to provide connecting points for new information	7		
4. Instructor gives an explanation about content	6		
5. Instructor responds to and/or builds on student(s)' comments	5		
6. Student generates an explanation about content	5		
7. Instructor addresses students' questions/concerns with an explanation	4		
8. Instructor gives a case as a good example of concept(s)	4		

Table 3 Continued

Codes	Frequency	Total Frequency	*Responses Per Student
9. Student(s) respond to and/or build on their peer's comments	3		
10. Mnemonic devices (embedded letter strategy)	1		
Intelligibility		37	7, 15, 2, 13
Personal Relevance		24	2, 5, 5, 12
Rehearsal/Repetition		22	3, 13, 0, 6
1. Multiple modes of representation	12		
2. Students hear something a number of times	10		
Information is meaningful to begin with		19	3, 6, 5, 5
Orienting Stimuli		19	3, 7, 3, 6
1. Physical	11		
2. Emphatic	7		
3. Emotional	1		
Metacognition		17	4, 5, 3, 5

Table 3 Continued

Codes	Frequency	Total Frequency	*Responses Per Student
1. Knowledge of your own resources	9		
2. Confusion	5		
3. Recognize when information is different from your understanding	2		
4. Recognize when your example is not consistent with the lesson	1		
Peripheral Route to Persuasion		6	0, 5, 1, 0
1. A pleasant context (humor)	5		
2. A credible, trustworthy source	1		
Organization		6	2, 1, 1, 2
1. Charts and matrices	3		
2. Hierarchies	3		
Plausible		1	0, 0, 1, 0

Note. *Frequency counts for each code per student, i.e., Amy, Patty, Nan, and Cathy.

Table 4

Reasons Candidates Gave Concerning Why They Learned on the Questionnaire

Codes	Frequency	Total Frequency
Elaboration		12
1. Instructor gives a case as a good example of concept(s)	5	
2. Instructor gives examples	2	
3. Student(s) generates example(s)	2	
4. Instructor reviews old information to provide connecting points for new information	2	
5. Instructor gives an explanation about content	1	
Active Participation/Experience		8
Intelligibility		8
Rehearsal/Repetition (Multiple Modes of Representation)		8
Personal Relevance		6
Information is meaningful to begin with		2
Orienting Stimuli		2
1. Physical	1	
2. Emphatic	1	
Organization (Hierarchies)		1

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